

their notice ; while the Superintendents themselves, by carefully and steadily pursuing the same plan year by year, by selecting from all their crops, and again selecting from that selection, will be able apparently, if the present results may be relied on, to increase the production and fruitfulness of the plant, and in the course of a few seasons to establish a veritable 'Pedigree Cotton,' as unlike its parent as the 'English thorough-bred,' with his long stride and fine skin, is unlike the stock whence he originally sprang. It remains for me to notice the avidity with which our surplus seed was purchased by the cultivators. Mr. Wilkinson says this seed was sufficient for the requirements of two villages, and that the crop produced was an abundant one. He further adds, 'I was informed by the Patel of one of the villages that this seed had given great satisfaction ; yields being reported of 96 lbs. to 150 lbs. cotton per acre, according to the amount of care in cultivation.' This gives an average of 123 lbs., but I will only take 100 lbs. as the *average* product, and even then I find the figures loudly speaking in favour of carefully picked and selected seed.

	Per acre.
	lbs.
Average yield of our Departmental seed ...	100
Average yield for Kandeish	82 $\frac{2}{3}$
Difference in favour of our seed	17 $\frac{1}{3}$
	or about 20 per cent.

If only this 20 per cent. could be established as the increased out-turn, by the efforts of our Department, it would bring wealth to thousands, and unspeakable benefit to the Presidency generally. It would represent an increased produce, valued at last year's rates, of Rs. 26,365,979 = £2,636,597 18s. od. ; a result and a prize worth striving for, and, it would appear, possible of attainment !"

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The election to the Professorship of Animal Morphology will take place on May 31.

The Moderators and Examiners for the Mathematical Tripos have announced that logarithmic tables will be provided for each of the candidates during the examination.

The mineralogical laboratory will be open to students during July and August.

The proposed enlargement of the space available at the new museums for Practical Morphology and Histology is to be at once proceeded with.

Mr. W. H. Caldwell, B.A., Scholar of Gonville and Caius College, is approved as a Teacher of Comparative Anatomy with reference to certificates for medical study.

Dr. Anningson has been approved as a teacher of Medical Jurisprudence in the Medical School.

The proposal to continue the opening of the Botanic Garden for three hours on Sundays to Members of the Senate accompanied by their friends during the summer months, has met with warm opposition from some who consider that in this case Sunday labour is imposed on others for the selfish pleasures of a few. It has been pointed out that owing to the value of the contents of the garden it must always be watched, and it could not possibly be said that the proposed regulations will impose additional Sunday labour. The voting on this question takes place to-day (25th).

LONDON.—Prof. Ray Lankester has been re-appointed Professor of Zoology and Comparative Anatomy in University College, London.

SCIENTIFIC SERIALS

American Journal of Science, May.—Photographs of the spectrum of the nebula in Orion, by H. Draper.—Mean annual rainfall for different countries of the globe, by A. Woeikoff.—Physiological optics, by W. L. Stevens.—Flood of the Connecticut River valley, from the quaternary glacier, by J. D. Dana.—Brazilian specimens of Martite, by O. A. Derby.—Method of determining the flexure of a telescopic tube for all positions of the instrument, by J. M. Schæberle.—Dykes of micaceous diabase penetrating the bed of zinc ore at Franklin furnace, by B. K. Emerson.—Occurrence of smaltite in Colorado, by M. W. Hess.—Conditions attending the geological descent of

some freshwater gill-bearing molluscs, by C. A. White.—Measurements of the rings of Saturn in the years 1879, 1880, 1881, and 1882, by E. S. Holden.—Interference-phenomena in a new form of refractometer, by A. A. Michelson.—New minerals, monatite and monite, with a notice of pyroclastite, by C. U. Shepard.—Marine fauna of New England, by A. E. Verrill.

Journal of the Franklin Institute, May.—On the several efficiencies of the steam-engine, and on the condition of maximum economy, by R. H. Thurston.—Ninety miles in sixty minutes, by W. B. Le Van.—Intonation of chime bells, by J. W. Nystrom.—The Mears chlorination process, by W. U. Greene. Action of charcoal on a solution of gold chloride, by G. E. Koenig.

Bulletin de l'Academie Royale des Sciences de Belgique, No. 3.—On the sensations the author experiences in his eyes, by M. Plateau.—On a claim of priority, introduced in the Academy by M. E. Dewalque, regarding my note on the origin of Devonian limestones of Belgium, by M. Dupont.—On the respiratory effects of excitation of the pneumogastric, by M. Henrijean.—Various products obtained from fresh stocks of peony ; new reaction of salicylic acid, by M. Jorissen.—Reports.

Reale Istituto Lombardo di Scienze e Lettere. Rendiconti, vol. xv, fasc. vii.—The geology of the Parman Apennines, by A. Del Prato.—The double quadratic transformation of space, &c. (concluded), by F. F. Archieri.—On rational skew curves, by L. Weyr.—On the transformation of the co-ordinates in space, by F. Borletti.

Fasc. viii.—On a formula of Cauchy, concerning the development of functions in infinite products, by P. Cazzaniga.—Whether cemeteries may have an injurious influence on the public health, by L. Gabba.—Remarks on the subject, by C. Zucchi, and reply by L. Gabba

Atti della R. Accademia dei Lincei, vol. vi., fasc. 10.—On some derivatives of citraconic acid, by Drs. Ciamician and Dennstedt.—Studies on fluoxysalts and fluosalts of molybdenum, by Signors Mauro and Panebianco.—Reports.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 4.—"On the Specific Resistance of Mercury." By Lord Rayleigh, F.R.S., Professor of Experimental Physics in the University of Cambridge, and Mrs. H. Sidgwick.

The observations detailed in the paper were made with the view of re-determining the relation between the B.A. unit and the mercury unit of Siemens, *i.e.* the resistance of a column of mercury at 0°, one metre in length, and one square millim. in section.

According to Siemens' experiments
 1 mercury unit = 0.9536 B.A. units,
 and according to Matthiessen and Hockin,
 1 mercury unit = 0.9619 B.A. units.

The value resulting from our observations agrees pretty closely with that of Siemens. We find—

1 mercury unit = 0.95418 B.A. units.

Four tubes were used to contain the mercury, of lengths varying from 87 to 194 centims. The diameter of the three first tubes was about 1 millim., and that of the fourth about 2 millims. The final numbers obtained from the several fillings of the tubes are as follows :—

Tube I.	{	0.95386	} 0.95416
		0.95412	
		0.95424	
		0.95436	
		0.95421	
Tube II.	{	0.95389	} 0.95419
		0.95414	
		0.95437	
		0.95436	
Tube III.	{	0.95424	} 0.95416
		0.95418	
		0.95399	
Tube IV.	{	0.95425	} 0.95427
		0.95440	
		0.95415	

Combining the results of the present paper with our determination of the B.A. unit in absolute measure, we get—
 1 mercury unit = 0.94130 × 10⁹ C.G.S.

Chemical Society, May 18.—Dr. Gilbert, president, in the chair.—The following papers were read:—On the precipitation of the alums by sodic carbonate, by E. J. Mills and R. L. Barr. The authors have determined the quantity of alumina precipitated in one hour from a solution of potash alum containing 1 per cent. of sulphate of alumina by varying quantities of sodium carbonate solution. The precipitation takes place in three stages: in the first no precipitation occurs—at the end of this stage, the ratio is 1 molecule of aluminium sulphate to $\frac{2}{3}$ of a molecule of sodium carbonate; during the second stage precipitation is continuous—at the end of this stage about $\frac{1}{2}$ the alumina is precipitated, the ratio, 1 molecule of the sulphate, to $\frac{1}{3}$ molecule of the carbonate; at the end of the third stage the precipitation is complete, the ratio being 1 molecule of the sulphate to $\frac{1}{2}$ molecule of the carbonate. Similar results were obtained by precipitating potassium alum.—On rotary polarisation by chemical substances under magnetic influence, by W. H. Perkin. The author has determined and compared the power which various organic liquids have of rotating the plane of polarisation, when under the influence of an electro-magnet; and he has calculated the rotary power possessed by the columns of liquids, which would be formed, by the condensation of unit-columns of their vapours, or, in other words, the rotary power possessed by lengths proportional to molecular weight. The numbers thus calculated clearly indicate that the molecular magnetic rotary power increases *pari passu*, with each increment of CH_2 .—On the constitution of Amarin and Lophin, by F. R. Japp and H. H. Robinson. By the action of parahydroxy-benzaldehyde upon benzil in presence of ammonia, the authors prepared a substance having the formula of hydroxylophin, which by distillation with zinc dust furnished crystals resembling in all respects the lophin prepared by Laurent, Fownes, &c. Lophin, therefore, belongs to Hübner's anhydrobases, and is an anhydrobenzoyldiamido-stilbene.

Geological Society, May 10.—J. W. Hulke, F.R.S., president, in the chair.—Arthur Leech was elected a Fellow, and Prof. L. Rüttimeyer a Foreign Member of the Society.—The following communications were read:—On the relations of *Hybecrinus*, *Baerocrinus*, and *Hyocystites*, by P. Herbert Carpenter, M.A. Communicated by Prof. P. Martin Duncan, M.B., F.R.S., V.P.G.S.—On the Madreporaria of the inferior oolite of the neighbourhood of Cheltenham and Gloucester, by R. F. Tomes, F.G.S.—On the exploration of two caves in the neighbourhood of Tenby, by Ernest L. Jones. Communicated by Prof. W. Boyd Dawkins, F.R.S., F.G.S. The caves noticed in this paper were that of Cogan, near Laugharn, partially described by Dr. Hicks in the *Geological Magazine* in 1867, and a cave known as Hoyle's Mouth, reported on to the British Association in 1860 by the Rev. Gilbert N. Smith. Both caves were rock-fissures. The Cogan cave had been a hyæna-den, as was shown by the deposits of crushed bones and coprolites trodden down into a solid mass by the passing of the animals. Besides remains of hyæna, it furnished those of horse, mammoth, tichorhine rhinoceros, elk, red deer, roe deer, reindeer, cave bear, cave lion, *Bos primigenius*, wolf, and fox. The presence of hippopotamus was doubtful. Besides these animals, the presence of Palæolithic man in the cave was indicated by some cut bones, and by two flint-flakes evidently chipped by man. In the second cave, Hoyle's Mouth, the hyæna, the cave bear, &c., were wanting, the place of the latter being taken by the common brown bear. In one part, remains of an old hearth were found; and the whole contents of the fissure pointed to a Neolithic date. At one time the cave appears to have been used as a place of sepulture.—Note on the comparative specific gravities of molten and solidified Vesuvian lavas, by H. J. Johnston-Lavis, F.G.S. From some experiments made on Vesuvian lava, Prof. Palmieri, in 1875, expressed the opinion that its specific gravity, when molten, might be as high as 5.0, though when cooled it is only 2.7. The author described the results of experiments made in December, 1881, on some lava flowing across the Atrio del Cavallo. Favourable circumstances enabled him to gain a position above a perfectly molten stream, the surface of which was protected from radiation by the heated walls of a tunnel which the lava had already formed by cooling of the crust. On to this were dropped, from a height of $1\frac{1}{2}$ yard (a) light scoria; this floated on the surface until lost to view (the stream could be watched for 150 yards or so); (b) fairly solid lava, with some vesicular cavities: this slowly sank, until after some distance it disappeared; (c) the most compact lava that could be found, in which, however, were a few small cavities;

this sank rapidly, the molten rock welling up round it. The author considered that these experiments demonstrate that the cooled lava is more dense than the molten, and that the apparently contradictory results obtained by Prof. Palmieri were due to the fact that the surface of the stream, by loss of heat, had become viscid, so that the solid material floated, though of greater density. The author concluded by citing other confirmatory evidence of his view.

Entomological Society, May 3.—Mr. H. T. Stainton, F.R.S., president, in the chair.—The president alluded to the interest which the late Mr. C. Darwin, who was one of the original members of the Society, had always shown in entomology.—The Secretary read a communication from the Secretary of the Essex Field Club, relative to the scientific importance of Epping Forest being preserved in its natural condition "unimproved," and requesting the members to join in a Memorial to the Conservators to this effect, lest it should be converted into a mere park.—Exhibitions: Varieties of *Fidonia atomaria* and *Anchoceles pistacina*, by Mr. W. C. Boyd; a male of *Cryptus titilator*, by Mr. T. R. Billups; a hybrid between *Antheraea Perryi* and *Roylii*, by Mr. W. F. Kirby; and a curious abnormal growth of the flowers of the ash (produced by a gall-mite), by Miss Ormerod. Mr. E. A. Fitch called attention to a woody spherical gall on ash keys, produced by a curmlionideon (?) larva.—Papers read: Further additions to Mr. Mashall's Catalogue of British Ichneumonidae, by Mr. J. B. Bridgman; a continuation of his synopsis of British Hymenoptera, by Mr. E. Saunders; and on the supposed abnormal habits of certain species of *Eurytomidae*, a group of the Hymenopterous family *Chalcididae*, by Prof. J. O. Westwood.

Meteorological Society, May 17.—Mr. J. K. Laughton, F.R.A.S., president, in the chair.—Miss W. L. Hall, Mr. E. J. Pearson, Dr. J. R. Somerville, and Mr. W. J. V. Vandenberg were elected Fellows of the Society.—The following papers were read:—On the diurnal variation of wind and weather in their relation to isobaric lines, by the Hon. Ralph Abercromby, F.M.S. By constructing synoptic charts at different hours of the same day, and by comparing the wind and weather records at the different hours, and examining their relation to mean curves of diurnal variation, the author shows that the mean diurnal increase of the wind's velocity is explained by the fact that for the same gradient there is more wind by day than there is by night. The mean diurnal veering of the wind is explained by the fact that in cyclones the wind is a little more incurved, and in anticyclones a little more outcurved, by night than by day. The mean diurnal increase of the frequency of rain during the day hours is explained by the fact that in any given cyclone the area of rain is larger by day than by night. The diurnal changes of every element are superimposed on the larger general changes, and are independent of each other. Great stress is laid on this point, both as explaining and classifying many meteorological questions, and as simplifying the problem of weather forecasting. The author gives a simple hypothesis, from which it appears that the diurnal veering and increase of rain follow as a natural consequence of the diurnal increase of velocity.—Mechanical conditions of storms, hurricanes, and cyclones, by W. F. Stanley, F.M.S.

Sanitary Institute of Great Britain, May 17.—Annual General Meeting.—Prof. F. S. B. F. Dechaumont, M.D., F.R.S., in the chair.—A favourable report was presented by the council on the progress made by the Institute during the past year. The chairman gave an address, and the officers for the ensuing year were elected, the President being His Grace the Duke of Northumberland, K.G., and the trustees Sir John Lubbock, Bart., D.C.L., F.R.S., Dr. B. W. Richardson, F.R.S., and Thomas Salt.

Institution of Civil Engineers, May 16.—Sir Frederick Bramwell, vice-president, in the chair.—The first paper read was "On the various systems of grinding wheat, and on the machines used in corn-mills," by Mr. W. Proctor Baker.—The second paper was on "Modern Flour-milling in England," by Mr. Henry Simon.—The third paper was on "Roller-mills and milling as practised at Budapest," by Mr. W. B. Harding.

EDINBURGH

Royal Society, May 15.—Prof. Balfour, vice-president, in the chair. Mr. Murray read an account of the explorations which had been carried out by Staff-Commander Tizard and himself in the Faroe Channel during the summer of 1880. In

H.M.S. *Knight Errant* they had taken a series of soundings and dredgings with the view of testing the truth of the theory that a barrier stretched across between the North-West of Scotland and the Faroe bank, separating the cold and warm deep-sea areas which previous exploration had shown to exist in close contiguity to each other. In this they had been quite successful, proving that there was a narrow barrier separating the northern cold area from the southern warm area. From the specimens of rock obtained from the top of this ridge, they concluded that the ridge was in all probability an ancient moraine. The objects, animal and otherwise, brought up from the bottom had been examined carefully by various scientific men, and the paper consisted in great part of their report—sixteen in all.—Mr. E. Sang, in a short notice of the solar eclipse of May 17, laid before the Society calculations which so supplemented for Edinburgh the times and phases given in the *Nautical Almanac* as to make the comparison between calculation and observation more accurate. Should the morning prove favourable for observation, he hoped to be able to lay before the Society the result of the comparison.—Prof. Tait communicated a paper by Mr. A. P. Laurie, on a new secondary cell, with which he had made a long series of experiments. The cell consisted of two copper poles dipping into chloride of zinc, and was charged in the usual manner by running a current through it. Zinc was deposited on the one pole, and cuprous chloride was formed at the other. Even with the small sized cells which were used, the results obtained were tolerably satisfactory. They suffered greatly from loss, however, being in this respect in no way superior to the other known forms of secondary cells.

PARIS

Academy of Sciences, May 15.—M. Jamin in the chair.—The following papers were read:—Observations of small planets with the great meridian instrument of Paris Observatory during the first quarter of 1882, by M. Mouchez.—New note on the project of formation, in Algeria and Tunisia, of a so-called interior sea, by M. Cosson. He brings forward a series of objections to the scheme.—Reply to M. Cosson's note, by M. de Lesseps.—M. Alph. Milne-Edwards presented, in his own name, the second volume of text, and vols ii. and iii. of plates (266 in number) of "L'Histoire Naturelle des Oiseaux de Madagascar." This raises to 400 the number of plates of birds.—Spiraloid drums for cables of equal resistance, by M. Haton de la Goupillière. This relates to extraction from mines. The first part treats of the general properties of every system, of rigorous equilibrium, whatever the form of the cable (cylindrical from end to end, formed of successive cylindrical parts, conical, logarithmic, &c.). In the second part, the general properties arrived at are employed to determine the drum of equilibrium in the case of the logarithmic cable, which represents the exact form of equal resistance. Simple formulæ are furnished for the radii of winding.—Synthesis of several organic compounds by means of electrolysis of water, of acid, alkaline, and alcoholic solutions with electrodes of carbon, by MM. Bartoli and Papasogli. They electrolysed distilled water during about six weeks, using a strong battery (1200 D) the first two days, then 100 Bunsens for ten days, then twenty Bunsens for thirty, the electrodes being carbon. Mixed with the disaggregated carbon was found a dark matter, which they call *mellogen*, because, in oxidation, it produces the acids of the benzocarbonic series. Its other properties are described. Using alkaline solutions (hydrates or carbonates) as electrolytes, the authors got a good deal of mellic acid and very little *mellogen*; the reverse being the case where the electrolyte was acid.—On the spherical representation of surfaces, by M. Darboux.—On the conditions of achromatism in phenomena of interference, by M. Hurion. He gives an experimental verification of a principle enumerated by M. Cornu. In a system of interference fringes from heterogeneous light giving a continuous spectrum, there is always an achromatic fringe which plays the part of central fringe, and is found where the most intense radiations present a maximum or minimum difference of phase.—Aperiodic galvanometer of MM. Duprez and d'Arsonval. This is for very weak currents. Between the poles of a horse-shoe magnet set vertically, is a rectangular frame wound with fine wire, connected by two wires, of silver or copper, with a bent support above, and an elastic slip below. These wires, whose tension is regulated by screws, are axial to the frame, to which they also bring the current. The upper wire has a mirror at its lower end; and within the frame is supported an iron tube to

strengthen the magnetic field. The authors indicate a method of graduating galvanometers.—On the length of sparks of the discharge of an electric condenser, by M. Villari. When a condenser is discharged by making it produce one spark or two, the length of the first is not equal to the sum of the lengths of the others, and the sum of lengths of the sparks is not always constant. Small sparks have the effect of elongating another produced at the same time in the circuit; and this influence grows with the charges of the condenser. It is connected with a sensible diminution of the interior discharge, and increase of the exterior.—Existence of lithine and boric acid in notable proportions in the waters of the Dead Sea, by M. Dieulafait. In a cubic centimetre there is enough lithine to distinctly show, at least a thousand times, the spectrum of that substance. The boric acid can be practically recognised with the product of a single cubic centimetre. The facts (contrary to previous ideas) prove the marine origin of the Dead Sea.—On the laws of solubility of carbonic acid in water at high pressures, by M. Wroblewski. The temperature remaining constant, the coefficient of saturation increases much less quickly than the pressure, while tending to a certain limit. The pressure remaining constant, the coefficient increases when the temperature diminishes.—On the mechanism of putrid fermentation of proteic matters, by MM. Gautier and Etard. The acid fermentation which arises in a few days is an epiphenomenon, not necessary, and not affecting the albuminoid molecules.—On a case of isomerism of bichloro-camphor, by M. Cazeneuve.—On purpurogalline, by MM. de Clermont and Chautard.—On the dimorphism of stannic acid, by MM. Levy and Bourgeois.—On chronic poisoning by arsenic, by MM. Caillet de Poncey and Livon. Cats receiving arsenic in small doses from time to time, eat more, and fatten, for a time, showing every sign of good health; but by and bye they grow lean, have diarrhœa, lose appetite, and become languid; and they die in an anæmic and lean state. The authors describe the changes (fatty degeneration) in the lungs, and mesenteric ganglions.—On a disease of early beans in the environs of Algiers, by M. Prillieux. A parasitic champignon produces white wadling-like tufts on the plant.—M. Laussedat said he had seen Mercury with the naked eye on May 11, at 8 p.m.

VIENNA

Imperial Institute of Geology, April 18.—The following papers were read:—C. Doelter, on pyroxenite, a proposal for the classification of the eruptive rocks.—V. Hilber, geological mappings of Zolkiew and Rawa-Ruska (Gallicia).—Th. Fuchs, which deposits are to be considered as of deep-sea origin? May 2.—T. N. Woldrich, contributions to the fauna of the Istrian breccia.—R. Zuber, geological notes from the Carpathian Mountains of Eastern Gallicia.

CONTENTS

	PAGE
CHARLES DARWIN, II.	73
THE TOTAL ECLIPSE	75
KANT'S CRITIQUE OF PURE REASON. By R. B. HALDANE	76
OUR BOOK SHELF:—	
Packard's "Insects Injurious to Forest and Shade Trees."—R. McLACHLAN, F.R.S.	78
Brown's "Law of Kosmic Order"	79
Wilson's Uganda and the Egyptian Sudan"	79
LETTERS TO THE EDITOR:—	
Dr. Siemens' Solar Hypothesis.—Prof. GEO. FRAS. FITZGERALD; Dr. C. WM. SIEMENS, F.R.S.	80
<i>Porcellia salvania</i> (Hodgson).—Sir J. FAYRER, F.R.S.	80
Pseudo-Glacial Phenomena.—Rev. T. E. TENISON-WOODS	80
Variability of number of Sepals, Petals, and Anthers in the Flowers of <i>Myosurus minimus</i> .—Dr. HERMANN MÜLLER	81
"A Dead Heat."—EDWARD MUYBRIDGE	81
Aurora Borealis.—W. PULLINGER	81
Bright Meteors.—G. L. TUFMAN	81
Curious Formation of Ice.—H. WARTH	81
The Existence of a Voice in Lizards.—C. MICHIE SMITH	81
THE ECLIPSE EXPEDITION	82
ANOMETRICAL OBSERVATIONS ON BOARD SHIP	83
INSTANTANEOUS PHOTOGRAPHY OF BIRDS IN FLIGHT (<i>With Illustrations</i>)	84
DR. FRITZ MÜLLER ON SOME DIFFICULT CASES OF MIMICRY. By ALFRED R. WALLACE	86
NOTES	87
OUR ASTRONOMICAL COLUMN:—	
The Trapezium of Orion	90
The Comet	90
GEOGRAPHICAL NOTES	90
FOOD-PLANT IMPROVEMENT. By Major HALLETT	91
UNIVERSITY AND EDUCATIONAL INTELLIGENCE	94
SCIENTIFIC SERIALS	94
SOCIETIES AND ACADEMIES	94